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DRAWING NOTICE

SD-31229-01 ISSUE 11-D
CD 3-D APP. 2-D
RATING Mfr. Disc.
SYSTEM Step-By-Step - Ckt.
DATE Jul. 6, 1955

TITLE

Step-By-Step System - Switch Trouble Alarm Circuit - For Use In Modifying Equipments - Having Dash Pot Relays - To Provide Common Timing Equipment

DESCRIPTION

REASONS FOR ISSUE AND SUPPLEMENTARY INFORMATION

6.1 The rating of this drawing is changed from "A&M Only" to "Mfr. Disc." as there is no anticipated future demand.

This is in accordance with the Program Of Rerating Of Low Demand J Specification Equipment Codes covered by P.E.M. 5580.

6.2 Current Drains are not affected.

6.3 Equipment information is covered by ED-31229-01, Iss. 9-D

6.4 Equipment Design Requirements are not affected.

6.5 No engineering letter will be issued.

STEP-BY-STEP SYSTEM
SWITCH TROUBLE ALARM CIRCUIT
FOR USE IN MODIFYING EQUIPMENTS
HAVING DASH POT RELAYS
TO PROVIDE COMMON TIMING EQUIPMENT

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The rating of this drawing is changed from "A&M Only" to "Mfr. Disc.", since there is no anticipated future demand.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 5241-ADS-LAF-RA

CIRCUIT DESCRIPTION
SYSTEMS DEVELOPMENT DEPARTMENT

CD-31229-01
Issue 3-D
Appendix 1-D
Dwg. Issue 10-D

STEP-BY-STEP SYSTEMS
SWITCH TROUBLE ALARM CIRCUIT FOR USE IN MODIFYING EQUIPMENTS HAVING DASH POT RELAYS TO PROVIDE COMMON TIMING EQUIPMENT

JAN 3 1946

CHANGES

B. CHANGES IN APPARATUS

B.1 Added

44B Resistance (C_1) W
44B Resistance (C_2) W
44B Resistance (C_3) W

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 "W" option is added in Fig. 1 to show the addition of a resistance in the lead connected to a number of alarm lamps for the purpose of limiting the current to the capacity of the fuse during periods of heavy traffic. It is being added at this time to agree with same feature previously added on other similar circuits as described in PEL-3610.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3350-RLQ-JLD

Printed in U. S. A.

CIRCUIT DESCRIPTION
SYSTEMS DEVELOPMENT DEPARTMENT
PRINTED IN U.S.A.

CD-31229-01
Issue 3-D
March 31, 1936
(7 Pages)

STEP BY STEP SYSTEM
SWITCH TROUBLE ALARM CIRCUIT FOR USE IN MODIFYING EQUIPMENTS HAVING DASH-POT RELAYS TO PROVIDE COMMON TIMING EQUIPMENT

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 Provision is made for connectors arranged for calling party control to give a disconnect alarm with a distinctive audible signal if the calling party fails to disconnect within a normal period of 3 to 7 minutes after the called party.

B. CHANGES IN APPARATUS

B.1 Added (Optional)

D-9468 green lamp figure 10
8B lamp (H) figure 14
1 mf. condenser (H) figure 14
B430 relay (H) figure 14
J3 relay (J) figure 14

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.1 The circuit requirements for the 221DJ relay (RLS) of figure 12 have been changed to the simplified form.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Figure 14 and "Z" wiring are added and are to be used to provide a distinctive audible signal for a disconnect alarm used with connectors arranged for calling party control. When figure 14 and "Z" wiring is used the green lamp of figure 10 and the "PU6" and "A6" leads of figure 5 to the common timing circuit are used.

D.2 Circuit notes 107, 108, 109, 110 and 111 are added.

All other headings under Changes - No Change.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

1.1 This circuit shows the switch trouble alarm equipment that is required to replace the dash-pot relay time delay system by the common timing system. It also shows time delay equipment and alarms for announcement trunk circuits.

2. WORKING LIMITS

2.1 None.

OPERATION

3. FUNCTIONS

3.1 To sound an audible alarm and light a ceiling lamp and switch frame lamp after a period of 18 to 48 seconds in case a primary master switch sticks, or pick-up lead between the primary and secondary master switches becomes grounded or in case a secondary or out trunk master switch sticks.

3.2 To sound an audible alarm and light a ceiling lamp, frame lamp and shelf lamp in 18 to 48 seconds in case the release magnet on a selector sticks.

3.3 To sound an audible alarm and light a ceiling lamp and a shelf lamp after a period of 18 to 48 seconds in case a release magnet on a connector sticks.

3.4 To sound an audible alarm and light a ceiling lamp, a frame lamp and a shelf lamp in a period of 22 to 44 minutes in case there is a permanent condition such as a subscriber removing the receiver and failing to dial on any of the selectors.

3.5 To sound an audible alarm and light a ceiling lamp and a shelf lamp in a period of 3 to 7 or 22 to 44 minutes in case a subscriber fails to hang up after a call is ended.

3.6 To sound an audible alarm and light a ceiling lamp and a lamp on the announcement trunk unit after a period of 14 to 48 seconds in case a release magnet on the announcement trunk switch fails on release.

3.7 To sound an audible alarm and light a ceiling lamp and a lamp on the announcement trunk unit after a period of 22 to 44 minutes in case of a permanent signal condition in the announcement trunk circuit.

4. CONNECTING CIRCUITS

4.1 Primary master switch circuit.

4.2 Relay equipment circuit for secondary master switches.

4.3 Relay equipment circuit for out trunk master switches.

4.4 A. E. Co.'s supervisory circuit.

4.5 Common timing circuit.

4.6 Announcement trunk circuit.

DETAILED DESCRIPTION

5. LINE AND OUT TRUNK SWITCH ALARMS

When a trouble condition occurs on primary master switches primary line switches, secondary master switches, secondary line switches, out trunk master switches or out trunk line switches, ground through a lamp is placed on the lead connecting with Figure 1. This will operate relay (A) through its primary winding when battery is placed on the "PU1" lead by the common timing circuit. Relay (A) then locks through its secondary winding to this ground. 18 seconds after battery is removed from the "PU1" lead, ground is placed on the "A1" lead through a resistance by the common timing circuit. This in turn operates relay (B) which will lock to the ground through resistances A and B and the switch frame lamp. The operation of relay (B) also operates relay (C). Relay (C) short-circuits resistances A and B, connecting the winding of relay (B) directly to the lead which is grounded through the lamp. The low resistances of relay (B) reduces the current through the secondary winding of relay (A) and relay (A) releases. This low resistance in series with the switch frame lamp and ground, lights the lamp. The purpose of resistances A and B is to protect the contacts of relay (B) in case several pick-up leads between the primary and secondary master switches ground at the same time as this combination would cause an excessive amount of current to flow through the contacts of relay (B) at the instant these contacts close. Relay (C) when operated also places battery on the lead to the ceiling lamp in Figure 7 lighting this lamp, and operates the 4 ohm relay shown dotted at right of lower section which in turn places continuous ringing current through the ringer sounding the latter. This condition continues until the trouble condition is removed when relay (B) will release, in turn causing relay (C) to release which removes battery from the ceiling lamp and permits the 4 ohm relay of lower section to release.

6. PERMANENT SIGNALS ON SELECTORS

When a selector is seized but not dialed, ground through the selector shelf lamp is placed on the lead connecting with Figure 3. This ground causes relay (D) to operate when battery is placed on the "PU2" lead by the common timing circuit. Relay (D) then locks on current through its secondary winding to this ground. Should this condition continue for a period exceeding 22 minutes, ground will be placed on the "A2" lead through a resistance by the common timing circuit and relay (E) will operate. Relay (E) then locks to this ground through the shelf supervisory lamp, reduces the current flow through the secondary winding of relay (D) releasing the latter relay, and permits sufficient current to flow through the shelf supervisory lamp to light the lamp. Battery through the selector frame supervisory lamp then passes through springs 3 and 4 of relay (E) and through the winding of relay (M) to ground, operating relay (M) and lighting the selector frame supervisory lamp. The operation of relay (M) places battery on the ceiling lamp in Figure 8 and ground through the 4 ohm relay shown dotted at left of lower section in the audible alarm circuit completes the path to light the ceiling lamp and operate the 4 ohm relay. The operation of this 4 ohm relay places battery on the buzzer causing it to sound. The lamps remain lighted and the buzzer continues to sound until the alarm condition is cleared at which time relay (E) releases removing battery from the shelf supervisory lamp and opening the circuit through the frame supervisory lamp and relay (M). Relay (M) releasing removes battery from the ceiling lamp and the 4 ohm relay in lower section. The release of the latter relay removes battery from the buzzer and it stops sounding.

7. SELECTOR RELEASE ALARMS

When a release magnet of a selector is energized, ground through the shelf release lamp is placed on the lead connecting with Figure 4 momentarily. The (D) relay will operate momentarily if battery is connected to the "PU1" lead at this time. If the release magnet remains energized for some time relay (D) operates through its primary winding when battery is placed on the "PU1" lead by the common timing circuit. Relay (D) then locks from battery through its secondary winding. 18 seconds after battery is removed from the "PU1" lead, ground through a resistance is placed on the "A1" lead by the common timing circuit. This operates relay (E) which locks to the ground through the shelf release lamp, reduces the current flow through the secondary winding of relay (D), releasing this relay and permits sufficient current to flow through the shelf release lamp to light it. The operation of relay (E) closes the circuit from battery through the frame release lamp through the winding of relay (M) to ground. This lights the frame release lamp and operates relay (M). Relay (M) then places battery through the ceiling lamp in Figure 9 to ground through the 4 ohm relay shown dotted at right of lower section. This lights the ceiling lamp and operates the 4 ohm relay which in turn places continuous ringing current through the ringer causing it to sound. The shelf lamp, frame lamp and ceiling lamp remain lighted and the ringer continues to sound until the trouble condition is cleared at which time relay (E) releases, removing battery from the shelf lamp and opening the circuit through the frame release lamp and relay (M). The release of relay (M) removes battery from the ceiling lamp and 4 ohm relay in lower section, releasing the latter relay which in turn removes the ringing current from the ringer.

8. PERMANENT SIGNALS OR DISCONNECT ALARM ON CONNECTORS

8.1 Permanent Signals

Should one of the parties to a connection fail to hang up at the termination of a call, ground through the connector shelf supervisory lamp is placed on the lead connecting with Figure 5. This operates relay (D) through its primary winding when battery is placed on the "PU2" lead by the common timing circuit. Relay (D) then locks on current through its secondary winding to this ground. Should this condition continue for a period exceeding 22 minutes, ground through a resistance will be placed on the "A2" lead by the common timing circuit and operate relay (E). Relay (E) then locks to the ground through the shelf supervisory lamp, reduces the current flow from the secondary winding of relay (D) causing relay (D) to release and permit sufficient current to flow through the shelf supervisory lamp to light it. Relay (E) also places battery through the ceiling lamp in Figure 10 and the winding of the 4 ohm relay shown dotted at left of lower section to ground. This lights the ceiling lamp and operates the 4 ohm relay which in turn places battery on the buzzer causing it to sound. When the condition is cleared, relay (E) releases due to the removal of ground through the shelf lamp and removes battery from the ceiling lamp and the 4 ohm relay in lower section. The release of this 4 ohm relay removes battery from the buzzer.

8.2 Disconnect Alarm

When the connectors are arranged for calling party control a disconnect alarm is used instead of the permanent signal alarm. When the called party disconnects before the calling party ground is connected through a shelf supervisory lamp and the relays of figure 5 function the same as described in paragraph 8.1 except that the (D) relay operates from battery over the "PU6" lead and ground is connected to the "A6" lead approximately 3 minutes later to operate the (E) relay. The ceiling lamp of figure 10 is green and it is lighted by the operation of the (E) relay in series with the (H) relay of figure 14. The (H) relay operated connects machine ringing to the (J) relay which will follow the machine ringing cycle being operated for 2 seconds and released for 4 seconds. The (J) relay operated causes the ringer to sound as if it were operated from machine ringing as a distinctive signal for connect or disconnect alarms. When the connector is released the circuit restores to normal.

9. CONNECTOR RELEASE ALARMS

When a connector release magnet is energized, ground is placed on the connecting lead to Figure 6 through a shelf release lamp. This operates relay (D) momentarily if battery is on the "PU1" lead at this time. If the release magnet remains operated relay (D) operates at the time battery is placed on the "PU1" lead by the common timing circuit. Relay (D) then locks on current through its secondary winding to this ground. Should this condition continue, ground through a resistance is placed on the "A1" lead by the common timing circuit 18 seconds after battery is removed from the "PU1" lead. This operates relay (E) which locks to the ground through the release lamp, reduces the current flow through the secondary winding of relay (D), releasing this relay and permits sufficient current to flow through the shelf release lamp to light it. The operation of relay (E) also places battery through the ceiling lamp in Figure 11 and the winding of the 4 ohm relay shown dotted at right of lower section, lighting the lamp and operating the relay. The operation of this relay places continuous ringing current through the ringer causing it to sound. When this trouble condition is cleared, ground through the shelf release lamp is removed causing relay (E) to release. This in turn removes battery from the ceiling lamp and 4 ohm relay in lower section. The release of this 4 ohm relay removes the ringing current from the ringer.

10. GROUND FUSES

Fuses are placed in the ground leads connecting with relay (M) of Figure 8 and relay (M) of Figure 9 to limit the current flow through these relays as a protection against overheating.

11. ANNOUNCEMENT TRUNK ALARMS FIGURES 12, 12-A AND 13

11.1 Permanent Signal Alarm

When a permanent condition exists on one of the announcement trunk circuits ground is connected to the "PS" lead in Figure 12 by the announcement trunk. This operates relay (F) on its primary winding when battery is connected to the "PU2" lead by the common timing circuit. Relay (F) locks on its secondary winding to the ground on the "PS" lead. The PS lamp, which is in series does not light at this time as the resistance of the (F) relay is too high. If this condition exists for a period of 22 minutes or more, ground will be connected through the "A2" lead by the common timing circuit operating relay (G). Relay (G) locks to the ground on the "PS" lead, shunts down relay (F), connects battery to the clear ceiling lamp in Figure 13 in series with the audible alarm circuit (shown dotted) operating it, and lights the PS lamp on the announcement trunk unit. The circuit remains in this condition until ground is removed from the "PS" lead when the circuit is restored to normal.

11.2 Release Magnet Alarm

When a release magnet in the announcement trunk is energized ground through the release magnet is connected to the "RLS BAT." lead in Figure 12 operating the (RLS) relay. The (RLS) relay grounds the primary winding of the (R) relay of Figure 12-A and if the release magnet is not released when battery is connected to the other side of the primary winding of the (R) relay by the common timing circuit, relay (R) will operate. Relay (R) then locks on its secondary winding. If this condition continues for 18 seconds or more, ground will be connected to the "A1" lead and operate relay (P1). Relay (P1) locks to the ground on the (RLS) relay and opens the circuit of the (R) relay, releasing it. Relay (P1) also lights the (RLS) lamp on the announcement trunk unit, and connects battery to light the green ceiling lamp in Figure 13 in series with the audible alarm circuit (shown dotted) operating it. The circuit remains in this condition until ground is removed from the "RLS BAT" lead when the circuit is restored to normal.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

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